Unit 3

Expressions

Exponents
Order of Operations
Evaluating Algebraic Expressions
Translating Words to Math
Identifying Parts of Expressions
Evaluate Formulas
Properties
Simplifying Expressions
Identifying Equivalent Expressions

Unit 3 IXL Tracking Log

	Required Skills	
	Skill	**Your Score**
Week of 9/30	**D.1** (Write expressions using exponents)	
	D.2 (Evaluate exponents)	
	O.3 (Evaluate numerical expressions)	
	Y.5 (Evaluate multi-variable expressions)	
Week of 10/7	**Y.3** (Write variable expressions: word problems)	
	Y.7 (Identify terms and coefficients)	
	Y.11 (Multiply using the distributive property)	
	Y.15 (Add and subtract like terms)	
	Y.16 (Identify equivalent expressions I)	
Week of 10/14	**Y.2** (Write variable expressions: two operations)	
	Y.12 (Factor using the distributive property)	
	Y.17 (Identify equivalent expressions II)	

Unit 3: Expressions
Standards, Checklist and Concept Map

Georgia Standards of Excellence (GSE):

MGSE6.EE.1: Write, evaluate numerical expressions with whole-number exponents.
MGSE6.EE.2: Write, read, and evaluate expressions with variables.
MGSE6.EE.2a: Write expressions that record operations with numbers and with letters standing for numbers. *For example, express "Subtract y from 5" as 5-y.*
MGSE6.EE.2b : Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. *For example, describe the expression 2(8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms.*
MGSE6.EE.2c : Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order.
MGSE6.EE.3: Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the expression 3(2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6(4x + 3y); apply the properties of operations to y + y + y to produce the equivalent expression 3y.*
MGSE6.EE.4 : Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). *For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.*

What Will I Learn?? Check off topics as you master them.

_____ I can evaluate expressions, including with variables and exponents

_____ I can translate words to expressions

_____ I can apply Order of Operations

_____ I can identify parts of expressions

_____ I can simplify expressions (combine like terms, distributive prop)

_____ I can substitute to evaluate formulas

_____I can identify equivalent expressions

Unit 3 Calendar: Math 6/7

9/30	10/1	10/2	10/3	10/4
Unit 3 Pretest Exponents	Order of Operations	Order of Operations	Evaluating Algebraic Expressions	Quiz
10/7	**10/8**	**10/9**	**10/10**	**10/11**
Translating Words to Math Identifying Parts of Expressions	Combining Like Terms	Combining Like Terms & Distributive Property	Combining Like Terms & Distributive Property	Quiz
10/14	**10/15**	**10/16**	**10/17**	**10/18**
Properties & Factoring	Unit 3 Pre/POST Test Review	Unit 3 Review Stations	Unit 3 Review Stations	Unit 3 Test

Vocabulary

Unit 3: Expressions		
Vocabulary Term	**What does it mean? Definition**	**What does it look like? Illustrate the vocabulary term.**
Algebraic expression	A group of variable(s), operation(s), and/or number(s) that represents a quantity. Expressions do not contain equal signs.	
Coefficient	A number which multiplies a variable	
Constant	A quantity that has a fixed value that doesn't change, such as a number.	
Exponent	Shows how many times to multiply the base number by itself	
Like terms	Terms whose variables (and exponents) are the same	
Order of operations	A specific order in which operations must be performed in order to get the correct solution to a problem	
Term	One part of an algebraic expression that may be a number, a variable, or a product of both	
Variable	A symbol, usually a letter, that represents a number	

Vocabulary

Vocabulary Term	**What does it mean? Definition**	**What does it look like? Picture/Example**
Associative property of addition	This property states that no matter how numbers are grouped, their sum will always be the same	
Associative property of multiplication	This property states that no matter how numbers are grouped, their product will always be the same	
Commutative property of addition	This property states that numbers may be added together in any order, and the sum will always be the same	
Commutative property of multiplication	This property states that numbers may be multiplied together in any order, and the product will always be the same	
Distributive property	Multiplying a number is the same as multiplying its addends by the number, then adding the products	

Math 6 – Unit 3: Expressions Review

1. Identify each part of the expression. Write "n/a" if the part is not in the expression: **$9(3x^2 + 4)$**

   a) coefficient: _____ b) constant: _____

   c) variable: _____ d) exponent: _____

   e) quotient: _____ f) product: _____

   g) factors: _____ h) sum: _____

   i) difference: _____

2. What does it mean when a number is squared or cubed? Give an example of each. _____

   _____

   _____

3. Evaluate the expression. Show EACH step. $10^2 – (14 – 2 +7)$

4. Write using exponents AND solve? $5 \bullet 5 \bullet 5 \bullet 5 =$

5. If m=5, evaluate the expression: $4m^2 + 6m$

6. Apply the distributive property to write an equivalent expression to $9(y – 3)$.

7. Combine like terms to simplify this expression: $8x^3 + 4x^2 + 12x^3 - x^2$

8. The cost of renting a moving truck is $39.99 plus an additional $0.50 for each mile driven. Write an expression to represent the cost of renting the truck for *m* miles.

9. Give an example of each of the properties below:

   a) commutative property: _____

   b) distributive property: _____

   c) associative property: _____

10. Write an expression for the product of 6 and c. _____

11. Write an expression for 22 less than y. _____

12. Which expression is not equivalent to the others?

    a) 3(4 + 2) b) 3(4) x 3(2) c) 3(4) + 3(2) d) 12 + 6

13. The formula A=lw can be used to find the area of a rectangle. Ms. Julien is mowing a rectangular lawn that is 9.5 yards long and 6 yards wide. What is the area of the lawn?

14. The formula for surface area of a cube is $SA = 6s^2$. Find the surface area of a cube whose side length (s) is 12 cm.

15. The expression $12n + 75$ can be used to find the total price for n students to take a field trip to the science museum. Evaluate the expression $12n + 75$ if there are 25 students attending the field trip. ($n = 25$).

16. Write a phrase for the expression $\frac{n}{7}$. _____

17. Which expression represents the phrase, "eight less than the product of six and b?

a) $8 - 6b$ b) $6 - b + 8$ c) $6b - 8$ d) $6b \times 8$

18. Evaluate 10 squared. _____

19. When you combine like terms, you mu8st look for terms with the same variable AND exponent. Choose the expression that is equivalent to $4m + 4m^2 - m + 6m^2 + 2m^2$

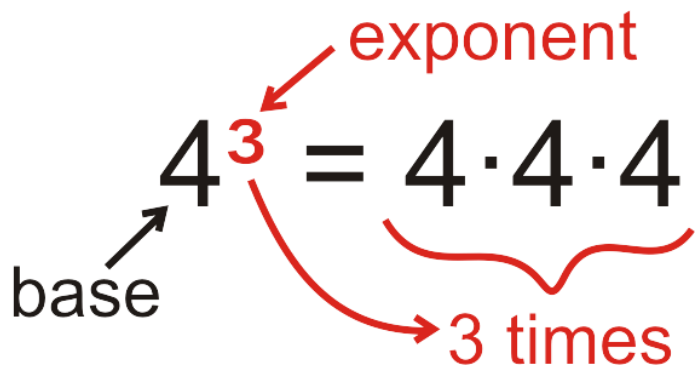
a) $15m^2$ b) $17m^2$ c) $12m^2 + 3m$ d) $10m^2 - 3m$

20. Silly Sally has a friend named Cuckoo for Cocoapuffs. He also does not understand how to apply the order of operations, and has made a mistake in the problem below. Find the mistake and explain in THREE COMPLETE SENTENCES what the mistake is and what should have been done. Then write what the correct answer really is.

$125 - 15 \bullet 2^3 + 5$
$125 - 15 \bullet 6 + 5$
$125 - 90 + 5$
$35 \quad 5$
40

Exponents

An _____ tells how many times to multiply a base by itself.



You read 4^3 as 4 to the 3rd power or 4 **cubed** or 4 to the third power.

You read 5^2 as 5 **squared** or 5 to the second power.

If a base is being raised to the zero power, it will always be equal to one.

When evaluating an exponent REMEMBER, an exponent only works on what it touches!

Example:

$2 + 3^3 = 2 + 27 = 29$ $(2 + 3)^3 = 5^3 = 125$

You Try:

Evaluate:

1) 2^4 2) $5 + 7^2$ 3) $(5 + 7)^2$

4) $10 - 3^2$ 5) $(10 - 3)^2$ 6) $2 - 2^0$

Exponents Practice

Example:

Exponential Form	Expanded Form	Value
2^5	2 • 2 • 2 • 2 • 2	32
Y^4	y • y • y • y	Depends on value of y
9^2	9 • 9	81
10^0		1
3^6	3 • 3 • 3 • 3 • 3 • 3	729

You Try: Fill in the blanks below to complete the chart.

Exponential Form	Expanded Form	Value
6^3		
	10 • 10 • 10	
4^2		
	x • x • x • x • x • x	
90^2		

FUN FACT: Any number raised to the __ power always equals __.
Let's explore why:

Exponential Form	Expanded Form	Value
2^3		
2^2		
2^1		
2^0		
2^{-1}		

Exponents Practice

Write using exponents.

1. $3 \times 3 \times 3 \times 3$ _____
2. 364×364 _____
3. $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$ _____
4. $13 \times 13 \times 13$ _____
5. $8 \times 8 \times 8 \times 7 \times 7$ _____
6. 49 _____

Write in expanded form.

7. 10^4 _____
8. 6^5 _____
9. 3^2 _____
10. 7^3 _____
11. 12^4 _____
12. 5 cubed _____

Write in standard form.

13. 5^4 _____
14. 2^6 _____
15. 11 squared _____
16. 10^7 _____
17. 12^2 _____
18. 6 cubed _____

Compare using <, >, or =.

19. 4^2 ◯ 2^4
20. 4^3 ◯ 3^4
21. 5^8 ◯ 5^9
22. 3^8 ◯ 3×8
23. 2^5 ◯ 5^2
24. 10^3 ◯ $10 + 10 + 10$
25. 5^3 ◯ $5 \times 5 \times 5$
26. 7^3 ◯ 3^7
27. 10^4 ◯ 4×10

For each number in exponential notation, identify the base, exponent, and power. Use a calculator to write each number in standard form.

28. A typical American kid watches about 18^4 television advertisements between birth and high school graduation.

    base _____ exponent _____

    power _____ standard form _____

29. The highest point in Kentucky is Black Mountain. Its height is about 2^{12} feet.

    base _____ exponent _____

    power _____ standard form _____

Order of Operations

When computing a problem that has more than one operation, the "Order of Operations" lists the order in which to work the problem to ensure that no matter who solves the problem, the answer will always be the same. Having this set of rules prevents us from getting multiple answers to the same problem!

MULTIPLICATION and **DIVISION** are a group and they are worked from left to right.

ADDITION and **SUBTRACTION** are a group and they are worked from left to right.

When solving problems using the Order of Operations, your problems will look like a triangle (or a Dorito!) You must show all of your work as you complete each step!

Examples:

$8 + 14 \div 7 \times 3 - 5$	$6 - (5-3) + 10$	$42 - (8 - 6) \times 2^2$
$8 + 2 \times 3 - 5$	$6 - 2 + 10$	$42 - 2 \times 2^2$
$8 + 6 - 5$	$4 + 10$	$42 - 2 \times 4$
$14 - 5$	14	$42 - 8$
9		34

You Try:

1) $2 \bullet 2 + 3^2$
2) $3 + (6 - 5)^3$
3) $(2 + 4)^2 \div 2$
4) $42 \div (3^2 - 3)$
5) $23 \bullet (3 + 4) \div 2$
6) $2 + 4^2 - (3 + 2)$
7) $4^2 \div 8$
8) $(3 - 1) + 6 \times 3$
9) $90 \div 9 - 5 + 8$

Expressions

An _____ is a mathematical statement that contains numbers and operations.

An _____ is an expression that contains at least one *variable*, along with operations and/or numbers.

Expressions	Algebraic Expressions	Non-Examples of Expressions
48 ÷ 12	48 ÷ *y*	*y* (this is a variable)
5^2	x^2	25 (this is a constant)
13 + 9	13 + *t* • 3	+ (this is an operation)

Parts of Expressions

$$2x^3 + 4x - 7$$

coefficients: 2 and 4
variable: x
quotient: none
factors: 2, x, and 4
difference: 4x – 7

constant: 7
exponent: 3
product: $2x^3$ and 4x
sum: $2x^3 + 4x$
terms: $2x^3$, 4x, 7

Example:

5x + 14 — This example has two terms, 5x and 14
5x is the product of 5 and x

2(8 + 7) — This example has three constants (2, 8 and 7)
There is a product (2 • (8 + 7))
There is a sum (8 + 7)
There are two factors (2 and 8+7)

You Try:

Use the expression below to identify the parts.

$$7y^2 + \frac{4x}{5} - 3$$

a) coefficient: _____ b) constant: _____
c) variable: _____ d) exponent: _____
e) quotient: _____ f) product: _____
g) factors: _____ h) sum: _____
i) difference: _____

Evaluating Expressions

To evaluate, or *solve* an algebraic expression, you **substitute** a number in place of the variable(s) and then find the value.

Note: When a number and letter are written side by side with no operation indicated, then it can be assumed you will multiply them together.

3x = 3 times whatever x is. 4*p* = 4 times whatever *p* is

6*u* + 4 = the sum of the product of 6 and whatever *u* is and 4

Examples:

Evaluate the following algebraic expressions when *a* = 10, *b* = 3, and *c* = 5.

b + 18 (given expression)	4*a* ÷ c (given expression)	b^2 (given expression)
3 + 18 (substitute 3 in for *b*)	4 • 10 ÷ 5 (substitute)	3^2 (substitute)
21 (solution)	40 ÷ 5 = 8 (solution)	9 (solution)

You Try:

Substitute to evaluate the following algebraic expressions when x = 2, y = 25 and z = 8. Show all of your work!

1) 3z	2) $y - z + x$	3) y^x
4) $z \div x$	5) $x + y + z$	6) $9 - x$
7) $100 - 10x - 10z$	8) $14 \div x + 2y$	9) w^0
10) xyz	11) $z(x + y)$	12) $x + x \bullet y$

Evaluating Expressions Extra Practice

Use substitution to evaluate each expression for the given value of the variable. Show your work!

1) $9y - 3$ (for y = 11)	2) $7m$ (for m = 5)	3) $d^2 - 2d$ (for d = 9)
4) $6q + 39$ (for q=10)	5) $6v$ (for v = 3)	6) $j^3 + 11$ (for j = 8)
7) $2k^2 + 5k + 2$ (for k = 11)	8) $\frac{n}{3} + n$ (for n = 27)	9) $a \div 3$ (for a = 42)
10) $4(11 + p) + 13$ (for p = 89)	11) $h^3 - 2$ (for h = 7)	12) $14z - 1$ (for z = 9)

Evaluating Expressions Extra Practice

Use substitution to evaluate each expression for the given value of the variable. Show your work!

13) $15e + 37$ (for e = 5)	14) $19r$ (for r = 8)	15) $x^2 + 2x + 4 + x$ (for x = 10)
16) $7(4 + h)$ (for h=21)	17) $13 + w$ (for w = 26)	18) $b - 15$ (for b = 15)
19) $\frac{y}{12} + y$ (for y = 72)	20) $3b^2 + 5b$ (for b = 2)	21) $8e + 22$ (for e = 42)
22) $2x^2 - 11x + 6$ (for x = 12)	23) $p^3 - 4p$ (for p = 4)	24) $16(3 + a) - a$ (for a = 13)

Using and Evaluating Formulas

A formula is a mathematical rule written using variables, usually an expression or equation describing a relationship between quantities.

To ***evaluate*** or ***solve*** a formula, you substitute the number for the variable.

Common Formulas

Area of a rectangle = l • w

Area of a triangle = $\frac{1}{2}bh$

Area of a Trapezoid = $h(\frac{b_1+b_2}{2})$

Surface Area of a Cube = $6s^2$

Volume of a Cube = s^3

<u>Example 1</u>: Mary Lou is setting up a lemonade stand. Her rectangular sign is 3 feet long and 2.5 feet wide. If the formula for area of a rectangle is A = l • w, what is the area of her sign?

A = l • w → *Step 1: Write the formula.*
A = 3 ft • 2.5 ft → *Step 2: Substitute for the variable(s).*
A = 7.5 ft² → *Step 3: Solve (in this case, multiply).*

<u>Example 2:</u> Billy Bob needs to figure out the volume of a cube. It is 12 in tall. Help him find the volume, if the formula is V = s³.

V = s³ → *Step 1: Write the formula.*
V = 12 in • 12 in • 12 in → *Step 2: Substitute for the variable(s).*
V = 144 • 12 → *Step 3: Solve (in this case, multiply).*
V = 1728 in³

<u>You Try:</u>

1) What is the surface area of a cube that is 4 in. tall?
2) What is the area of a rectangle with a height of 8.5 cm and a width of 3 cm?
3) What is the area of a triangle with a height of 5m and a base length of 9m?
4) What is the area of a trapezoid that is 4cm high, with bases that are 10cm and 12cm long?
5) Why are formulas useful/helpful?

Words and Phrases to Math Symbols

Words can be translated into math symbols to form expressions and equations. Here is a list of key words to look for.

Addition

Plus
And
Total of
Altogether Increased By
Combined Add Sum
Together More Than
Added To
In All
Make

Subtraction

Subtract Gave Take Away
Decrease By Fewer Minus
Shared Fewer Than Less Than
Difference Less

Multiplication

Times Triple
Double Product
Multiplied By
OF
Increased By a Factor
Twice Multiple

Division

Quotient of Per Ratio of
Divided By Half Divisor
Divided Into Percent Split Up

Equals

Is Are Were Was

Will Be Yields Sold For

Parenthesis Words

The Quantity of
Twice the sum of
Times the sum of
Times the difference of
Plus the difference of

Writing Algebraic Expressions

Translating words into math symbols or math symbols into words can be done in many ways. Here are just a few examples.

Operation	Verbal Expressions	Algebraic Expressions
+	- add 3 to a number - a number plus three - the sum of a number and 3 - 3 more than a number - a number increased by 3	n + 3
–	- subtract 12 from a number - a number minus 12 - the difference of a number and 12 - 12 less than a number - a number decreased by 12 - take away 12 from a number - a number less 12	x – 12
X	-2 times a number -2 multiplied by a number -the product of 2 and a number	2m or 2 · m
÷	- 6 divided into a number - a number divided by 6 - the quotient of a number and 6	a ÷ 6

Example:

Translate the words into math symbols.

1) add 43 to a number, *n*
   43 + *n*

2) a number, *w* decreased by 12.
   w – 12

3) 8 less than a number *y*
   y - 8

You Try:

1. add 43 to a number *n*
2. a number x divided into 25
3. 7 times a number *e*
4. take away a number *c* from 16
5. difference of a number *q* and 24
6. product of a number *r* and 41
7. 13 more than a number *j*
8. a number *a* less 49
9. a number *v* decreased by 28
10. a number *b* multiplied by 46
11. 30 minus a number *h*
12. a number *u* divided by 36
13. quotient of 23 and a number *e*
14. 8 less than a number *y*
15. subtract a number *m* from 19
16. 9 more than the twice a number a
17. sum of a number z and 34
18. 3 increased by a number *p*
19. 33 increased by a number *u*
20. add 6 to a number *k*
21. take away a number *f* from 20
22. The difference of 9 and x
23. sum of a number *b* and 35
24. a number x times 44
25. a number *w* decreased by 12
26. a number *j* minus 10
27. 32 less a number *t*
28. 48 multiplied by a number *q*
29. 4 divided by a number *s*
30. difference of a number *c* and 2

Commutative & Associative Properties

The **Commutative Property** says that the order in which you **add** or **multiply** two numbers does not change the sum or product. For any numbers *a* and *b*: $a + b = b + c$ **and** $a \times b = b \times a$

*Think commute, (like how you **move** to work) the numbers can move position without changing the outcome.*

The **Associative Property** says that the way you group numbers when you **add** or **multiply** them does not change the sum or product. For any numbers *a*, *b* or *c*: $(a + b) + c = a + (b + c)$ **and** $(ab)c = a(bc)$

Think associate, (like how you associate with your friends) the numbers can "hang out" in different groups and not change the outcome.

Example:

Which property is illustrated by each statement?

1) $13 + 14 = 14 + 13$

2) $2 + (3 + 4) = (2 + 3) + 4$

You Try:

1) $3 + 4 = 4 + 3$

2) $2(9) = 9(2)$

3) $xy = yx$

4) $g + h + 2 = g + 2 + h$

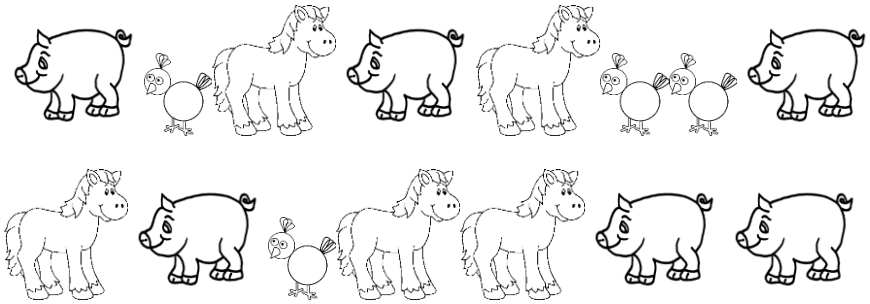
5) $(2 + 5) + 7 = 2 + (5 + 7)$

6) $(6 \bullet 5)\, x = 6\, (5 \bullet x)$

7) $7 + m = m + 7$

8) $3\, (4 \bullet 5) = (4 \bullet 5)\, 3$

Combining Like Terms



Part 1: Look at the pictures of the farm animals below. Determine how many pigs, chickens, and horses there are.

Pigs: _____ Horses: _____

Chicken: _____

Part 2: Write an algebraic expression to show how many of each animal are on your paper. Instead of pictures, use variables to represent each animal. **Use p for pig, c for chicken, h for horse.**

_____

Part 3: Simplify your algebraic expression by combining like animals.

_____

Part 4: What if a horse got lost? How would you represent that in your expression?

_____

More Combining Like Terms

Combining Like Terms is like matching your socks. In the same way that we put our socks in matching pairs, we can combine like terms to put terms with the **same variables and exponents** together.

Examples:

1) **2x** and **3x** have the same variable (x) to the same exponent (^{1}), so they can be combined to make 5x.
2) **5y²** and **4y²** have the same variable (y) and the same exponent (^{2}), so they can be combined to make 9y².
3) **8m** and **3m²** are **NOT** like terms because they do have the same variable, but not the same exponent.

Some helpful hints to make combining like terms easier.

1) You can put different shapes around like terms before you combine them to make sure you don't miss any terms. Make sure you put the shape around the sign too!

$$6m + 2p + 3 + 4p - 2m + 4$$

2) You can also highlight like terms before you combine them to make sure you don't miss any terms. Make sure you highlight the sign too!

$$6m + 2p + 3 + 4p - 2m + 4 =$$

$$6m - 2m + 2p + 4p + 3 + 4$$

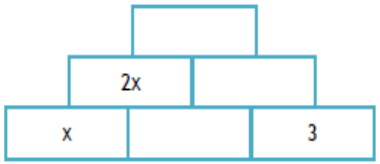
$$4m + 6p + 7$$

You Try:

1) $5x + x^2 + 8y - 2x + 3x^2 =$
2) $9 + 6k + 3 + 2k^2 + 3 + 7k^2 =$
3) $12x + 3y - 2a + 6y - 5x =$
4) $5 + 6m + 12 - 6m - 17 =$
5) $12h + 3p - 9h + 3 - 3p =$
6) $3x + 2y + x =$
7) $8d + 2c - 2d + c =$
8) $10b^2 + 10b + 10b^2 =$
9) $7a + 3n + 3a^2 =$
10) $3m^4 + m^2 + 2m^4 =$
11) $\frac{1}{4}d + \frac{2}{3}g + \frac{1}{4}d =$

Combining Like Terms Pyramids

1.



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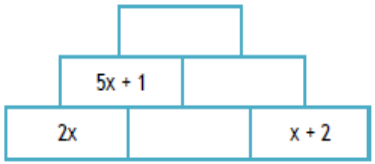

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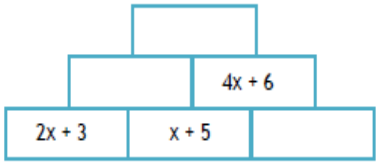

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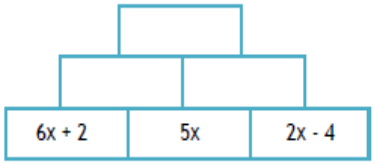

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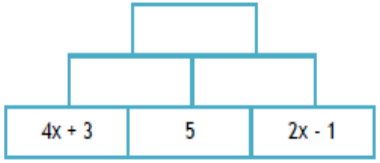

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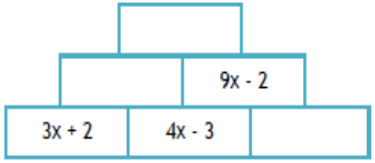

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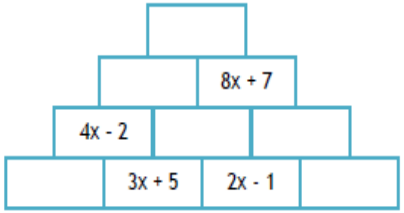

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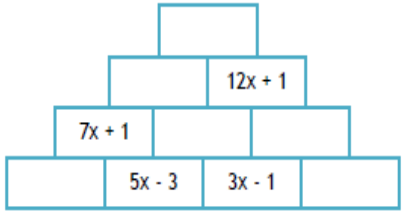

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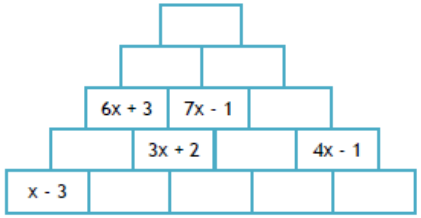

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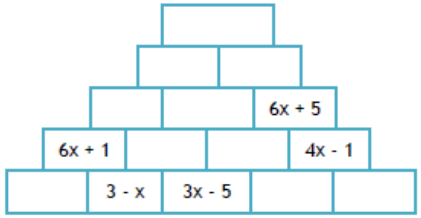

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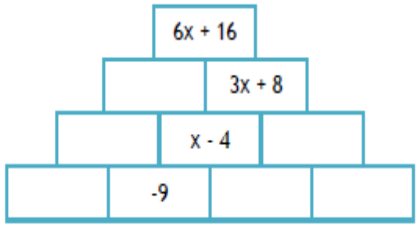

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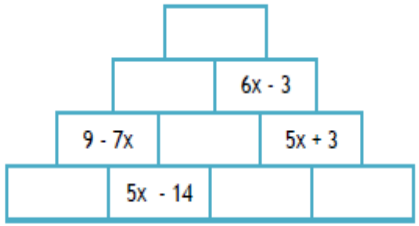

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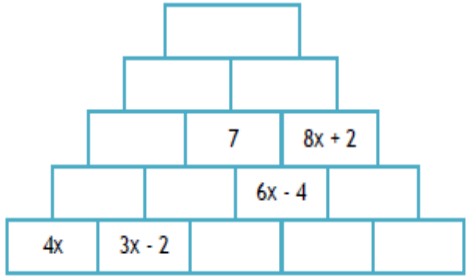

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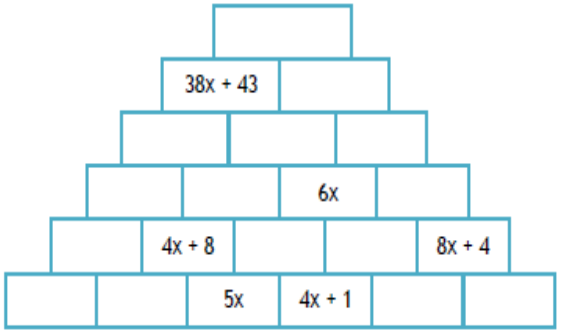

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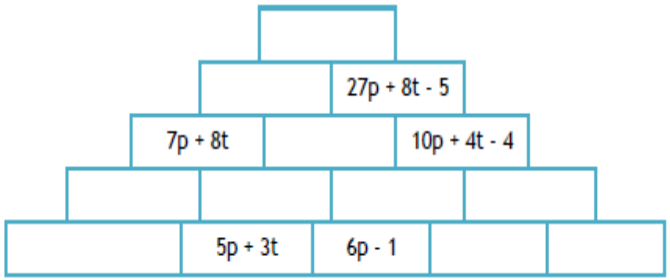
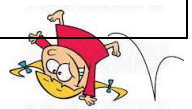


Combining Like Terms Error Analysis

Sally is a silly little girl who makes mistakes! In Column #1, analyze her work and *circle her mistake*. In Column #2, explain what she did wrong. In Column #3, show how Silly Sally should work out the problem correctly. Show ALL work!

Silly Sally's Work (Circle her mistake):	**What did Silly Sally do wrong?**	**Show Silly Sally how it's done! (Show ALL steps!)**
$6x + 5x + 2y$ $11x + 2y$ $13xy$		
$3a^2 + 4a^2 - a^2$ $7a^2 - a^2$ $8a^2$		
$m + 3m - 4m + 2m$ $4m - 4m + 2m$ $16m + 2m$ $18m$		
$6y^3 + 2y^2 + 4y^3 + 2y^2$ $8y^2 + 4y^3 + 2y^2$ $10y^2 + 4y^3$		
$13x + 5 + 17x - 4.5 + x$ $18x + 17x - 4.5 + x$ $35x - 4.5 + x$ $30.5x + x$ $31.5x$		
$12r^2 + 3 + 8rs + 4r^2 - 16r^2$ $16r^2 + 3 + 8rs - 16r^2$ $24r^2s + 3 - 16r^2$ $8r^2s + 3$		



The Distributive Property

Distributive Property

Words To multiply a sum by a number, multiply each addend by the number outside the parentheses.

Example

Numbers	Algebra
$2(7 + 4) = 2 \times 7 + 2 \times 4$	$a(b + c) = ab + ac$

Think of the factor that is being distributed as the mamma bird. What happens when the mamma doesn't feed her babies? They die! Don't kill off the baby birds, make sure mamma feeds them all!

Example

1. $10 \bullet 23 = 10\ (20 + 3)$

$10 \bullet 20 + 10 \bullet 3$

$200 + 30$

230

<u>You Try:</u>

1) $12 \bullet 41$ 2) $11 \bullet 45$ 3) $2 \bullet 123$

2. **Use the Distributive Property to rewrite $2(x + 3)$.**

$2(x + 3) = 2(x) + 2(3)$ Distributive Property

$= 2x + 6$ Multiply.

You Try:

1) 8(x + 3) 2) 5(9 + x) 3) 2(x + 3)

3. **Fran is making a pair of earrings and a bracelet for four friends. Each pair of earrings uses 4.5 centimeters of wire and each bracelet uses 13 centimeters. Write two equivalent expressions and then find how much total wire is needed.**

Using the Distributive Property, $4(4.5) + 4(13)$ and $4(4.5 + 13)$ are equivalent expressions.

$4(4.5) + 4(13) = 18 + 52$
$= 70$

$4(4.5 + 13) = 4(17.5)$
$= 70$

So, Fran needs 70 centimeters of wire.

You Try:

Each day, Martin lifts weights for 10 minutes and runs on the treadmill for 25 minutes. Write two equivalent expressions and then find the total minutes that Martin exercises for 7 days.

The Distributive Property

Solve these problems two ways, use the distributive property and the order of operations.

1) 5(9 + 11) 2) 12 (3 + 2)

Use the distributive property to rewrite the following expressions. Combine like terms if necessary.

3) 5(2 + 8) 4) 10(x + 2) 5) 14(a + b)

6) 12(a + b + c) 7) 7(a + b + c) 8) 10(3 + 2 + 7x)

9) 1(3w + 3x + 2z) 10) 5(5y + 5y) 11) 9(9x + 9y)

12) 2(x + 1) 13) 6(6 + 8) 14) 4(5v + 6v)

15) 3(2 + 6 + 7) 16) 2(3x + 4y + 10x) 17) 5(5x + 4y)

Factoring

Factor an Expression

When numeric or algebraic expressions are written as a product of their factors, the process is called **factoring the expression**.

Example

Tutor

1. Factor 12 + 8.

$12 = 2 \cdot 2 \cdot 3$ Write the prime factorization of 12 and 8.

$8 = 2 \cdot 2 \cdot 2$ Circle the common factors.

The GCF of 12 and 8 is $2 \cdot 2$ or 4.

Write each term as a product of the GCF and its remaining factor. Then use the Distributive Property to *factor out* the GCF.

$12 + 8 = 4(3) + 4(2)$ Rewrite each term using the GCF.

$= 4(3 + 2)$ Distributive Property

So, $12 + 8 = 4(3 + 2)$.

Factoring is the inverse of the distributive property. When you are factoring, you are looking to pull out the common factors that are in the addends. (You have to find the mamma and take her out!)

<u>You Try:</u>

Find the common factor (mamma bird) and factor it out of the expressions below.

1) 9 + 21 2) 14 + 28 3) 80 + 56

Factoring Practice

Factor the expressions.

1) $20g + 45$	2) $40 + 64u$
3) $35d + 21$	4) $48n + 4$
5) $90s + 80$	6) $55r + 44$
7) $99n + 45$	8) $12m + 22$
9) $10c + 8$	10) $45g + 81$
11) $14m + 16$	12) $21y + 9$
13) $35d + 40$	14) $12 + 8p$